

#255

OSO-4

RASTER SCAN

BACKGROUND RASTER SCAN DATA

67-100A-08A

67-100A608B

REQ. AGENT

RAND NO.

ACQ. AGENT

OSO-4

RASTER SCAN & BACKGROUND RASTER SCAN DATA

67-100A-08A

67-100A-08B

This data set has been restored. The DR and DS tape are 9 track, binary and multi-filed. The DR tape is a 3480 cartridge and the DS tape is 6250 BPI. The DR, DS, and DD numbers along with the time spans are given as follows:

67-100A-08A

RAW RASTERS

<i>DR #</i>	<i>DS #</i>	<i>DD #</i>	<i>FILES</i>	<i>TIME SPAN</i>
<i>DR02911</i>	<i>DS02911</i>	<i>D-02853</i>	<i>1</i>	<i>10/19/67 - 11/15/67</i>
		<i>D-02854</i>	<i>2</i>	<i>11/15/67 - 11/28/67</i>
		<i>D-02855</i>	<i>3</i>	<i>11/28/67 - 12/18/67</i>
		<i>D-04870</i>	<i>4</i>	<i>12/24/67 - 02/03/68</i>
		<i>D-04871</i>	<i>5</i>	<i>01/29/68 - 02/28/68</i>
		<i>D-04872</i>	<i>6</i>	<i>03/07/68 - 04/18/68</i>
		<i>D-04873</i>	<i>7</i>	<i>04/08/68 - 05/12/68</i>

67-100A-08B

BACKGROUND RASTERS

<i>DR #</i>	<i>DS #</i>	<i>DD #</i>	<i>FILES</i>	<i>TIME SPAN</i>
<i>DR02912</i>	<i>DS02912</i>	<i>D-02856</i>	<i>1</i>	<i>10/25/67 - 12/18/67</i>
		<i>D-04874</i>	<i>2</i>	<i>04/08/68 - 05/12/68</i>

REQ. AGENT

PAR

OSO-4

ACQ. AGENT

CDSW

RASTER SCAN & BACKGROUND RASTER SCAN DATA

67-100A-08A

67-100A-08B

This data set catalog consists of 7 OSO-4 Raster Scan (08A) and 2 Background Raster Scan (08B) tapes. They are 800 BPI, Binary, created on an IBM 360 computer. The 'D' tapes are 9-track and the 'C' tapes are 7-track. The tapes contain one file of data each.

67-100A-08A

RAW RASTERS

<u>D#</u>	<u>C#</u>	<u>START</u>	<u>STOP</u>
D-04870	C-09429	12/24/67	2/03/68
D-04871	C-09430	1/29/68	2/28/68
D-04872	C-09431	3/07/68	4/18/68
D-04873	C-09432	4/08/68	5/12/68
D-02853	C-02174	10/20/67	11/15/67
D-02854	C-02175	11/15/67	11/28/67
D-02855	C-02176	11/28/67	12/18/67

67-100A-08B

BACKGROUND RASTERS

<u>D#</u>	<u>C#</u>	<u>START</u>	<u>STOP</u>
D-04874	C-09433	4/08/68	5/12/68
D-02856	C-02177	10/26/67	12/18/67

OUTPUT:

The output is in two forms. An on-line listing and an edited 7 track 556 BPI tape for printing.

HOW TO USE:

JCL CARDS

```
// Job Card      -5 min, 5 min
// Exec PL1,Param='CHAR48'
//Source.SYSIN DD *,DCB=BLKSIZE=80

PL/1 Source
    Deck
/*
// Exec Assembly
//Source.SYSIN DD *                                For each Assembly
                                                Language Program

Assembly Language
    Deck
/*
// Exec Linkgo,REGION.Go=300k
Raw Raster // Go.RAWTAP DD UNIT=2400-9,Disp=(OLD,PASS),DSNAME=RAWTAP,*
Data Tape  // DCB=(RECFM=V,LRECL=3976,BLKSIZE=3980,DEN=2), *
           // LABEL=(2,BLP),VOLUME=SER=Z1409
Background // Go.INTAPE DD UNIT=2400-9,DISP=(OLD,PASS),DSNAME=TAPIN, *
Raster Data // DCB=(RECFM=V,LRECL=3880,BLKSIZE=3884,DEN=2), *
Tape       // LABEL=(2,BLP),VOLUME=SER=Z1263
Output     // Go.OUTAPE DD UNIT=2400-7,DISP=(NEW,PASS),DSNAME=OUTP. *
Tape       // DCB=(RECFM=V,LRECL=3976,BLKSIZE=3980,DEN=1,
           // TRTCH=ET),LABEL=(,BLP),VOLUME=SER=1263
           // Go.PL1DUMP DD SYSOUT=A,SPACE=(CYL,(2,2)),DCB=RECFM=
           // VBA,LRECL=137,BLKSIZE=7265)
           // Go.SYSIN DD *
```

INPUT CARD

Column

1-15 Start time for printout
16-30 Stop time for printout

Both times should be punched with decimal point; as days and fraction since January 0, 1967.

31 Print-all indicator

If non-blank, this indicator is set and all rasters within time limits (other than calibration rasters) are printed.

Raw Raster and Average Background Raster Data from the AS&E OSO-D Pointed X-ray Telescope

The AS&E OSO-D pointed x-ray telescope experiment has been described in detail by Giacconi et al. (1968). The output data consists of a 48 x 40 word array containing the counting rate of the photoemission-scintillation x-ray detector (counts/0.14 sec.) as a function of raster position. This is referred to as the "raw raster". In addition to solar x-rays, the raw raster counting rates contain background counts which are due to spacecraft generated noise which is a function of raster position, and energetic charged particle counts which depend upon spacecraft orbital position and time, but which are independent of raster position. In order to determine the counting rate due to solar x-rays as a function of raster position, one must subtract from the raw raster and "average background raster" which consists of the spacecraft generated noise and the average charged particle counting rate (excluding periods when the spacecraft is passing through the South Atlantic anomaly).

The average background raster is generated by subtracting the constant N_{cal} the counting rate due to the FE* calibration source, from the "average calibration raster" generated by summation of all calibration rasters(excluding rasters obtained when the spacecraft was passing through the South Atlantic anomaly). The constant, N_{cal} propositional to x-ray detector efficiency, is determined by subtraction of the average counting rate in 40 raster positions where no solar x-rays are expected in the least sensitive mode of the experiment form average counting rate in the corresponding 40 positions of the average calibration raster.

An x-ray filtergram of the Sun is therefore obtained by a point by point subtraction of the appropriate average background raster form the raw raster.

Reference

Giacconi, R., Gursky, H., Paolini, F., and Rockwell, C.: 1968, "final Report for AS&E OSO=IV X-ray Pointed Telescope and Rotating X-ray Wheel Experiments" ASE-1921

Format of Raw Raster and Background Raster Tapes
From the AS&E Grazing Incidence X-ray Telescope
on the pointed Section of OSO-D

Both formats share the following properties:

1. They are written as standard IBM System/360 variable length, (type V) unblocked records.
2. They are written via programs coded in PL/I language, byte may be read from PL/I, assembly language, and COBOL (but not FORTRAN).
3. They are 9 track, 800 bits per inch, NRZI Mode.

If it is ever required to read these tape from FORTRAN, assembly language subroutines will have to be written. Note that if these tapes had been written using the standard FORTRAN-compatible format, they would have been 2 to 3 times as long. This is because FORTRAN uses short block lengths (less than 300 bytes), which makes for inefficient tape utilization, since most of the tape is then made up of inter-record gaps.

RAW RASTER TAPE

Each record has the same format.

TOTAL BLOCK LENGTH: 3980 including control bytes

RECORD LAYOUT (excludes TYPE V control bytes):

BYTES

- 1-8 Universal time of first word in raster array, below.
Given as days and fraction, since January 0, 1967. This is a System/360 double precision floating point number.
- 9-16 Universal time of first word is analog subcom #5 array, described below. Given as day and fraction, since January 0, 1967. This is a system/360 double precision floating point number.
- 17-20 Actual number of OSO-D words in raster. For a full, normal raster this will be 1920. Given as binary integer.
- 21-24 Number of OSO-D words in each of the Subcom arrays, described below. Given as binary integer.

25-28 Number of questionable data words in the raster; that is, the number that have the first, but not the second, flag bit set. Given as binary integer.

29-32 Number of unitelligible rasters skipped since the last raster on tape. Given as binary integer.

33-36 Number of missing data words in the raster; that is, the numbers that have the second flag bit set. Given as binary integer.

37-40 This is a binary integer that is ordinarily zero. Set to 1 if this raster is short due to Sunset. Set to 2 if this raster is short due to break in data.

41-44 This binary integer is always zero.

45-48 This binary integer indicates the filter wheel position.

- 1-Binary code 00, Mylar
- 2-Binary code 01, 1/2 mil beryllium
- 3-Binary code 10, calibration source
- 4-Binary code 11, 2 mil beryllium
- 5-Cannot determine

Filter wheel position is determined from the values in analog subcom #5 array.

49-52 This binary integer indicates the aperture wheel position:

- 1-Binary code 00, 40 mil, 4.0 arc minute diameter
- 2-Binary code 01, 10 mil, 1.0 arc minute diameter
- 3-Binary code 10, 10 mil, 1.0 arc minute diameter
- 4-Binary code 11, 40 mil, 4.0 arc minute diameter

Aperture wheel position is determined from the values in analog subcom #7 array.

The data words that follow are taken from the original telemetry tapes supplied by GSFC, and are given in their original form, including flag bits. Each data word occupies 16 bits, as follows:

1-6 Not used

7 Flag bit 1, if this bit, and not the next is set, then the data word is questionable.

8 Flag bit 2; if this bit is set, the data word is missing and should be ignored. If both flag bits are set, this data is filler at the end of the GSFC data file.

9-16 OSO-D 8 bit telemetry word, in its original form.

All 5 of these data arrays are fixed in length; that is, they each occupy a fixed number of bytes on the tape. The logical length is given in each case by one of the binary integers described above. If this logical length, n , is greater than the number of OSO-D words, m , allowed on the tape, then only m words appear, and the remainder are lost. If n is less than m , then only the first n words in the tape record are meaningful, and the remaining words should be ignored.

53-3892 These are the main frame raster words; they are given in the order in which they occurred in the telemetry (i.e., in the order in which the instrument scanned). The first four words should be all 1 bits, since they cover the period when the instrument is starting the new scan and is transmitting all 1 bits. Space is allowed for 1920 data words (a full raster). Logical length is given by integer in (17-20) above.

3893-3912 Sail Analog subcom #5 words (filter wheel).

3913-3932 Sail Analog subcom #7 words (a aperture wheel).

3933-3952 Sail analog subcom #27 words (Door status & -6v supply).

3953-3972 Sail Analog sub com #44 words (+2.4 KV monitor).

Note that all the analog subcom words were received during the time period from the first to the last raster word. They therefore pertain to the condition of the instrument during the raster scan. The logical length of each of these arrays is the same, and is given by the integer om (21-24) above. Note also that these words, since they are in their telemetered form, are not converted back to voltages.

BACKGROUND RASTER TAPE

Each record on this tape has the same format.

TOTAL BLOCK LENGTH: 3884, including control bytes.

RECORD LAYOUT (Excludes TYPE V control bytes):

1-4 a=estimated absolute efficiency of CsI photoemission-scintillation x-ray detector 2.1 Å x-rays.

5-6 Universal time of start of interval for which this background raster applies.

9-12 Universal time of end of interval to which this background raster applies.
Universal time gives day and fraction since January 0, 1967.

13-16 \bar{N}_{cal} =average uniform count rate on raw calibration raster (emitted by
 FE^{ss} calibration source)

$$\bar{N}_{cal} = N_{40}(cal) - N_{40}(1)$$

17-20 Δ_{cal} =statistical error in \bar{N}_{cal}

21-24 \bar{N}_{40} (cal)=average count rate of 40 positions along north and south edges of raw calibration rasters.

25-28 Δ_{40} (cal)=statistical error in
 N_{40} (cal)

29-32 $N(1)$ =average counting rate of 40 positions along north and south edges of raw, one arc minute aperture, 2 mil Be filter raster

33-36 $\Delta_{40}(1)$ =statistical error in $N_{40}(1)$

All the above quantities are given as System/360 single precision floating point words.

37- This is the background raster. It is always 1920 words long.

3876 The first four words are not very meaningful since they cover the period at the start of the scan where the instrument reads out all 1 bit. The words are given out by the telemetry. Each word occupies two bytes on the tape, and is given in decimal. Three decimal digits are given with one place after the decimal point. The order of words is identical to that on the raw raster tape.

NAME: OSO-D Corrected Raster Program GRST

PURPOSE: Generated corrected rasters for AS&E pointed solar x-ray experiments on board
OSO-D

FUNCTIONAL DESCRIPTION:

The program reads as input:

- a) AS&E solar x-ray raw raster tape
- b) Corresponding AS&E solar x-ray background raster tape
- c) Input card

The input card gives start and stop time for printout, and indicator whether or not all corrected raster are to be printed.

The program reads each raw raster form the raw raster tape, skipping those that do not fall within the time limits specified, and also all calibration rasters. If the print-all indicator is set, then all remaining rasters within the time limits are printed. If it is not set, then every raster is printed that has at least seven OSO-D words such that

$$\bar{N}_i - B_i \leq 2\sqrt{B_i}$$

where \bar{N}_i is the count rate determined from the OSO-D word.

B_i is the background count rate form the same position in the background raster.

For each raster that is printed, the following processing is done:

- 1) Filter wheel and aperture wheel positions are determined from the raw raster tape and printed.
- 2) \bar{N}_{ea} and ϵ are printed
- 3) Subcom voltages are printed
- 4) The corrected raster is printed.
- 5) For each OSO-D word the following algorithm is used:
 $N_a = \bar{N}_i - B_i$ (N_a is corrected count rate, \bar{N}_i and B_i are as above)

If N_a is less than 1.0, print "--"
if print-all indicator is not set and $N_a < 2\sqrt{B_i}$
then print "--"

Print 2 digits: n.n, giving $\log_2 N_a$:
If $\log_2 N_a \geq 10$, the first digit is printed as A=10 B=11, etc.

If the raster word is missing (flag bit 2 set) print "++"
If the raster is short (<1920 words) and the word is beyond the end, print "=="

DUMP OF TAPE CN1116

Dec 29/11

00 09/09 - May 12/68

INPUT TAPE CINIT ON FT
DATA INPUT H9 NF=7 SR=1=1 SR=

88 K. J. FREDRIKSEN

